CURRICULUM OF CIVIL ENGINEERING RGUKT BASAR

II YEAR I SEMESTER

Subject Code	Course Name	L-T-P	Credits
CE2101	Surveying	4-0-0	4
CE2102	Building Materials and Concrete Technology	4-0-0	4
CE2103	Mechanics of Materials	4-1-0	4
CE2104	Mechanics of Fluids	4-1-0	4
MA2103	Mathematics-III	4-0-0	4
HS2101	Communication Skills-I	2-0-0	1
CE2701	Surveying Lab	0-0-3	2
CE2702	Materials Testing Lab	0-0-3	2
CE2703	Mechanics of Fluids Lab	0-0-3	2
CE2901	Seminar-I		1
Total		22-2-9	28

SURVEYING

Externals: 60Marks

Internals: 40Marks

L-T-P-C 4-0-0-4

Objectives:

- To study the basic concepts and principles of chain survey
- To know the importance of the compass survey and its practical applications
- To understand the basic methods and applications of plane table survey
- To know the field applications and concepts of leveling survey
- To study the different methods of calculation of area, contouring and measurement of volumes
- To know the importance of theodolite total station and their practical applications .
- To study the basic concept of trigonometrical leveling, and field applications .
- To analyze the horizontal and vertical curves for survey work related to road and railways .
- To know the principles of aerial photogrammetry and its applications .
- To study the various applications of GPS,GIS and remote sensing for field work.

Unit – I

Introduction: Overview of plane surveying (chain, compass, levels, theodolite and plane table), objectives.

Chain survey: Principles of chain survey – various instruments employed in chain surveymeasuring tapes – types of chains – direct and indirect ranging – obstructions in chaining – well conditioned triangle ,correction to chain or tape – cross staff survey , errors in linear measurements with incorrect chain length , line ranger and cross staff , use of optical square and clinometers.

Compass surveying:Objectives, types of compass, types of bearings: whole circle bearing system, quadrantile bearing system, Fore bearing and back bearing, true meridian, magnetic meridian, dip ,magnetic declination. Calculation of included angles from bearings. Calculation of bearings from included angles. Local attraction: Detection and its elimination .Errors in compass survey, compass traversing (open, closed), Correction of errors in closed traverse graphically by Bowditch's method.

Unit - II

Leveling:Definitions, various components required in leveling. Types of leveling instruments. Use of Dumpy, Tilting and Auto levels. Type of Benchmarks, types of leveling: longitudinal leveling and cross- sectional leveling, fly leveling and reciprocal leveling. Determination of reduced levels by height of instrument method and rise and fall method.Sensitivity of bubble tube, Errors in leveling, curvature and refraction correction.

Contouring: Definition of contour, contour interval and characteristics of contours .Direct and indirect methods of contouring -uses of contours, Grade contours.

Unit - III

Computation of Areas and Volumes: Computation of areas along regular boundaries. Computation of area consisting of irregular boundaries by Simpson's rule and trapezoidal rule. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits by means of contour lines and sections.Computation of volume from spot levels.

Plane Table Survey: Components of plane table surveying, Setting up, centering and orientation of plane table, methods of plane table survey: Radiation method, Intersection or triangulation method, Traversing method, Resection method (Three point and two point problems). Plane table contouring using tangent clinometers, errors in plane table survey. Advantages and disadvantages of plane tabling.

Unit – IV

Theodolite: Construction details of Vernier, theodolite, definitions, temporary and permanent adjustments. Measurement of horizontal angle by repetition and reiteration methods, Measurement of vertical angle.

Theodolite traversing and computations: Traversing by included angle and bearing-conditions of closed Traverse- Gale's traverse table, closing error and its adjustments by various methods, Co-ordinates, Traverse and their computations.Trigonometrical leveling. Introduction to Electromagnetic Distance Measurement (EDM) and Total station.

Unit - V

Curves: Types of curves, design and setting out – simple and compound curves. **Advanced Equipments:** Total Station, GPS, GIS, Remote Sensing.

Suggested Readings:

1. Arora KR "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004

2. "Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) ltd., New Delhi.

3 .Duggal S K, "Surveying (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004.

4. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi

BUILDING MATERIALS AND CONCRETE TECHNOLOGY

Externals: 60Marks

Internals: 40Marks

L-T-P-C 4-0-0-4

Objectives:

- To study about the basic building materials, properties and their applications
- To know the smart building materials, external paints and their uses.
- To understand different types of masonries and their applications.
- To study about standard dimensions of doors, windows, ventilators and other components of buildings.
- To understand the basic concept of planning of buildings for different storey height.

Unit – I

Stones:Uses of stones as building materials, classification, characteristics, dressing and polishing of stones, methods of quarrying and construction.

Bricks: Methods of manufacturing bricks .Classification and methods of construction.

Timber: Timber as a building material and its uses .Methods of seasoning and preservation laminates and their uses. Scaffolding and form work. Defects in Timber.

Masonry: Brick Masonry: Definition, bonds in brick masonry, principles in brick masonry construction. Stone masonry and basic comparison with brick masonry

Unit – II

Plastering and pointing: Different types of plasters and plastering process, defects in plastering. **Floors:** Common types of floors, methods of construction.

Paints, Varnish and Distemper: Constituents, characteristics of good paints bases, vehicles, thinners and coloring pigments.Painting of different types of surfaces varnish and its types, application. Distemper, dry and oil bound, and application of distemper.

Smart building Materials: Energy conservation in buildings -use of recycled materials, regional materials and industrial waste products as means of sustainable development. Green Building Materials.

Unit – III

Cement: Introduction to cement, different grades, Types of cements and their composition – manufacture of Portland cement – hydration of cement and hydration product, Structure of hydrated cement – heat of hydration, Gel theories and tests on properties of cements.

Mortar and Sand: Characteristics of good mortar making sand, availability of sand and its classification, bulking of sand, manufacturing methods of mortar. Different types of mortars preparation, setting and curing.

Concrete: Introduction to concrete, nominal mix and design mix of concrete.

Coarse and fine Aggregate: Characteristics of good coarse and fine aggregates for manufacturing of concrete. Classification of aggregates, particle shape and texture, bond strength of aggregates and its influence on strength of concrete, porosity, absorption and moisture content and their influence, soundness of aggregate, alkali aggregate reaction, sieve analysis and grading of aggregate, tests on properties of aggregates.

Unit - IV

Properties of Fresh Concrete: Mixing and hatching, workability, factors effecting workability, various test producers, segregation and bleeding, vibration of concrete, types of vibrators and their influence on composition, analysis of fresh concrete.

Properties of Hardened Concrete: strength of concrete, water cement ratio, Gel space ratio, effective water in the mix, short term and long term properties of concrete, test and procedure, influence of various parameters on strength of concrete, relationship between various mechanical strengths of concrete, curing of concrete, maturity concept, influence of temperature on strength of concrete, stress-strain curves for concrete, durability of concrete.

Strength of Concrete: - Shrinkage and temperature effects - creep of concrete – permeability of concrete – durability of concrete – corrosion – causes and effects – remedial measures – thermal properties of concrete – micro cracking of concrete.

Unit - V

Admixtures Used In Concrete: Classification of admixtures.Chemical and mineral admixtures. Influence of various admixtures on properties of concrete. Applications, concept of ready mix concrete- self compacting concrete, fly ash concrete- properties and proportions of fly ash, application, silica fume, rice husk ash concrete

Mix Design Of Concrete: Basic consideration, process of mix design, factors influencing mix proportions-mix design by ACI method and IS code method, design of high strength concrete, quality control, various methods of mix design, IS code method, British and ACI methods.

Suggested Readings:

- 1. V.N Vazirani, and S.P.Chandola, Engineering Materials, Khanna Publishers 1993
- 2. Sushil Kumar, Building Construction, Standard Publishers 1992
- 3. S.P Arora and S.P Bindra, Text book on Building Construction, Dhanapath Raj Publications, 1999
- 4. Dr. N.KumaraSwamy, A.KameswaraRao, Building Planning and Drawing, Charotar Publishers.

MECHANICS OF MATERIALS

Externals: 60Marks Internals: 40Marks

L-T-P-C 4-1-0-4

Objectives:

- To understand the basic concept of the stress and strain for different materials
- To know the mechanism of the development of shear force and bending moments in beams
- To analyze and understand bending stress and shear stress
- To study compound stresses, direct and bending stresses in different members
- To know the concept of unsymmetrical bending and shear centre for different members

UNIT-I

Simple Stresses and Strains: Definition of stresses and strains-Hooke's Law – Modulus of Elasticity -Stress – Strain curve for ductile materials -working stress and factor of safety - Deformation of bars under axial loads -uniform sections and abruptly varying sections - deformation due to self-weight-Impact load, Gradually applied load-Strain energy- Bars of uniform strength -Poisson's ratio-volumetric strain and restricted strains- relationships between elastic constants. Compound bars and temperature stresses: Statically intermediate problems in tensions and compression.

Analysis of stresses:Stress at a point, Components of stress in Rectangular coordinates, Stress tensor, Plane stress, Transformation Equations, Stress invariants, Principal stresses, Mohr's circle for plane stress,

UNIT-II

Thin Cylinders: Thin cylinders subjected to internal fluid pressure, volumetric change.

Thick Cylinders: Lame's equations, stresses under internal and external fluid pressures-Compound cylinders- Shrink fit pressure.

Torsion: Geometry of deformation of a twisted circular shaft, Stress and deformation in twisted circular solid and hollow shafts, Strain energy due to torsion, Power transmitted by circular shafts.

Springs: Types of springs. Close coiled and open coiled springs.

UNIT-III

Column stability:Euler's theory for long columns- different end conditions- equivalent length-Rankine's theory. Eccentrically loaded columns- Secent and perry's formulae.

Shear Force and Bending Moment diagrams: Different types of beams and loads-shear forceand bending moment diagrams for cantilever, and simply supported beams with and without over hangs subjected to different kinds of loads viz., point loads, uniformly distributed loads, uniformly varying loads and couples -Relation between loading, shear force and bending moments.

UNIT-IV

Bending Stresses in Beams: Assumptions in theory of simple bending- Derivation of bending equation, Moment of resistance-calculation of stresses in statically determinate beams for different loads and different types of structural sections.

Shear Stress in Beams: Equation of shear stresses, distribution across rectangular, circular, triangular, L, T sections.

Combined Stresses: Beam subjected to bending and shear, shaft subjected to bending and torsion, short columns.

UNIT-V

Deflection in beams:Slope and deflection by double integration method for cantilever, simply supported beams and overhanging beams carrying one, two point loads, u.d.l. and uniformly varying load over entire span. Moment area and conjugate beam method.

Suggested References:

- 1. Beer, F.P., and Johnston, JR, E.R., "Mechanics of Materials", (2nd Edition), McGraw Hill, 1992.
- Boresi, A.P., Schmidt, R.J. and Sidebottom, O.M., Advanced Mechanics of Materials (4th Edition), John Wiley and Sons, 1993.
- 3. Popov, E.P., Mechanics of Materials, Prentice Hall of India Private Limited, 1976.
- 4. Pytel, A. and Singer, F.L., Strength of Materials (4th Edition), Harper Collins Publishers, Singapore, 1987.
- 5. Srinath, I.S., Desayi, P.Murthy, N.S. and AnanthaRamu, S., Strength of Materials, McMilan India Ltd., 1997.
- 6. Timoshenko, S. and Young, D.M., Element of Strength of Materials (5th Edition), Affiliated East-West Private Limited, 1968.

CE2104 MECHANICS OF FLUIDS

Externals: 60Marks Internals: 40Marks

L-T-P-C 4-1-0-4

Objectives:

- To know various fluid properties, concept and method of fluid pressure measurement.
- To understand the basic concepts of fluid motion.
- To study different equations of fluid motion and fluid dynamics.
- To analyse different flow characteristics of laminar and turbulent flows.
- To study the motion of gases for different conditions of expansion.

Unit - I

Fluid properties: Basic concepts and equations: Specific weight, Specific volume, Specific mass, Gravity, Viscosity, Bulk modulus, Vapour pressure, Capillarity and Surface tension. Measurement of pressure: Manometers, Bourdon gauge, Micro manometer, pressure on curved surfaces.

Unit - II

Fluid Kinematics: Stream lines, path lines, streak lines, stream tubes, classification of fluids, steady and unsteady flows, rotational flows, laminar and turbulent flows, uniform and non-uniform flows, rotational and irrotational flows-one, two, three dimensional flows, stream function, and velocity potential, significance and use of flow nets.

Unit - III

Fluid Dynamics: Convective and local acceleration, concept of continuity, three dimensional continuity equation, body forces and surface forces, body force potential, Euler's equation of motion for 3-D flow, Bernoulli's equation by integration of Euler's equation, significance of Bernoulli's equation and its limitations.

Unit - IV

Laminar and Turbulent flow through Pipes: Reynold's experiment, significance of Reynold's number, critical velocity, hydraulic gradient, laminar flow through circular pipes, Poiseuille equation, turbulent flow through pipes- Darcy's equation, friction factor, Moody's diagram, pipes in parallel and series. Classification of pipes based on different pipe materials, factors influencing different pipe materials for networks.

Unsteady flow in pipes: Water hammer phenomenon, pressure rise due to gradual and sudden closure of valve, critical period of time.

Unit - V

Compressible flow: Compressibility of liquid and gases, different form of continuity equation; Bernoulli's energy equation for Isothermal and adiabatic conditions, velocity of pressure wave, wave velocity for Adiabatic and Isothermal conditions, Mach number and Mach cone, Stagnation pressure and temperature.

Suggested Reading:

1. K.Subramanya, Theory and Applications of fluid Mechanics, Tata McGraw-Hill publishing company Ltd., New Delhi, 1993.

- 2. Vijay Gupta and Santhosh K. Gupta, Fluid Mechanics and its applications, Wiley Eastern Ltd., New Delhi, 1984.
- 3. K.L Kumar, Engineering Fluid Mechanics, Eurasia Publishing House PVT Ltd, New Delhi, 2009.
- 4. P.N.Modi and S.M.Seth., Hydrualics and Fluid Mechanics, Standard Book House, 1995.
- 5. Fluid Mechanics & Hydraulic Machines, S.C. Gupta, Pearson Publishers.
- 6. Introduction to Fluid Mechanics, Edward J. Shaughnessy, Jr., Ira, M.Ktz and james P.Schaffer, Oxford Higher Education.
- 7. Principles of fluid Mechanics and Fluid Machines, M. Narayanapillai, University Press.
- 8. Fluid Mechanics and Hydraulic Machines, Dr. R. K. Bansal, Lakshmi Publications.

MA2103

MATHEMATICS - III

Externals: 60Marks Internals: 40Marks

L-T-P-C 4-0-0-4

Objectives:

- To introduce Laplace Transforms and its applications in solving Differential equations.
- To Introduce Functions of Complex variables, Power series, Bilinear Transformations & Conformal Mapping.
- To introduce Random variables, Probability distributions and its applications.
- To introduce the concepts of statistics applicable in estimation and testing.

UNIT-I

LAPLACE TRANSFORMS:

Introduction of Laplace Transforms, Sufficient Condition of Laplace Transforms, Laplace transforms of derivatives, Laplace Transforms of Integrals (I& II Shifting theorems),Laplace transforms of Unit Step functions,Dirac delta-function and error function, Periodic functions.

Differentiation of Laplace Transforms (Multiplication by t), Integration of Laplace Transform (division by t), Convolution theorem, Inversion. Solving Initial Value problems, System of Linear differential equations, Integral equations.

<u>UNIT-II</u>

Functions of Complex Variables: Limits and continuity of function, differentiability and analyticity, necessary and sufficient condition for function to be analytic, Cauchy Riemann Equations in polar form, Harmonic functions.

Complex Integration: Definition, Cauchy's integral theorem for multiple connected regions, Cauchy's integral formula, Cauchy's formula for derivatives and their applications

<u>UNIT –III</u>

Power Series, Taylor's Series, Laurent's Series, Zeroes and Singularities, Residues, Residue theorem, Evaluation of real integrals using residue theorem, Bilinear Transform, Conformal Mapping.

UNIT-IV

Probability:

Random Variables:Definition of random variables (one variable and two variables). Properties of discrete and continuous random variables.

Probability Distributions and Probability Densities: Definition and properties of probability Mass function and Probability Density function. Definition of Cumulative Distribution function and its properties for Discrete and Continuous distributions.

Mathematical Expectation:Concept of mathematical expectation of functions of random variables and their significance.

Distributions: Binomial, Poisson, Negative Binomial distributions, Uniform, Normal and χ^2 distributions

UNIT-V

Measures of Central Tendency: Mean, median and mode for grouped and ungrouped data. Quartiles, variance and percentiles for given data.

Sampling and Estimation of Parameters: Concepts of sampling and estimation of mean and variance of a distribution form the sample.

Hypothesis Testing: Formulation of hypothesis and alternate hypothesis. One-sided and twosided tests. Comparison of means. Tests of Significance, t-test, F-test, $\chi^2 test$

Text Books:

- **1.** Erwin Kreyszig, Advanced Engineering Mathematics, 8thEdition, John Wiley & Sons Ltd 2006.
- **2.** R.K. Jain & S.R.K.Iyengar, Advanced Engineering Mathematics, Third Edition, Narosa publications, 2007.
- **3.** Gupta, S.C., Kapoor V.K., Fundamentals of Mathematical Statistics (11th Edition), Sultan Chand & Sons, 2002.
- **4.** Ross, S.M., Introduction to Probability and Statistics for Engineers and Scientists (4th Edition), Academic Press, 2011

Reference Books:

- **1.** R.V.Churchill, "Complex Variables & its applications", McGraw-Hill Company, INC.
- **2.** B.S. Grewal and J.S. Grewal, "Higher Engineering Mathematics",(40th Edition), Khanna Publishers,2007
- *L-T-P-C stands for number of lectures, tutorials, practices and credits

HS2101

SOFT SKILLS-I

Externals: 60 Internals: 40

L-T-P-C* 2-0-0-1

Objectives:

- > To implement practically the skills needed for employment.
- > To deal with the society in an acceptable way.
- > To make them competent to attempt and qualify in various tests.
- > To make them proficient in using vocabulary in various situations.

UNIT-I

Vocabulary Building – Teaching Root words – Word association - How to talk about Personality Type - How to talk about Doctors - How to talk about Various Practitioners - How to talk about Science and Scientists - How to talk about various Speech Habits - How to insult your enemies - How to flatter your friends - How to talk about a variety of personal characteristics -How to talk about actions

UNIT-II Common Errors in English

UNIT-III

Twenty -four seven - L for gist - NDTV debates - L for specific information - Ted Talks - L for detail - Devils' Advocate - **Picture perception** – Describing people, paintings, cartoons etc.

UNIT-IV

Read between the lines – R for Pleasure - Reading Newspaper - Movie Reviews - R for Specific information – Essays - Textbooks

UNIT-V

Now you are talking - Giving Opinions - Stating Facts - Agree and disagree - Decisions and Intentions - Raising Questions - Giving and receiving effective feedback

UNIT –VI Writing Dailogue

Suggested References:

- 1. Word Power Made Easy
- 2. Ted Talks
- 3. NDTV Talks
- 4. Newspapers (The Hindu, Times of India)

SURVEYING LAB

Externals: 60Marks Internals: 40Marks List of experiments:

 Measurement of distance by ranging and chaining and locating various objects by chain & cross staff surveying.

- 2) Determination of area of polygon by chain and cross staff survey.
- Measurement of bearings of sides of traverse with prismatic compass/surveyor's compass and computation of correct included angles.
- 4) Locating given building by chain and compass traversing.
- 5) Determination of elevation of various points with dumpy level by Height of instrument method and rise & fall method.
- Fixing bench mark with respect to temporary bench mark with dumpy level by fly leveling and check leveling.
- Measurement of horizontal angles theodolite by method of repetition method and vertical angles with theodolite.
- 8) Locating given objects by Radiation and Intersection methods by plain table.
- 9) Three point problem in plane table traversing.
- 10) Contour plan of given area by radial or grid method.
- 11) Demonstration of Total station instrument.

L-T-P-C 0-0-3-2

MATERIALS TESTING LAB

Externals: 60Marks Internals: 40Marks

L-T-P-C 0-0-3-2

List of experiments:

- 1. To study the stress strain characteristics of mild steel by Universal Testing Machine.
- 2. Determination of ultimate shear strength of mild steel specimen by single/double shear test.
- To determine the hardness of a given material by Rockwell hardness testing machine and Brinell's hardness testing machine.
- 4. Determination of Young's modulus using simply supported beam setup.
- 5. Determination of the energy absorbed and impact strength of steel using Charpy impact testing machine and Izod impact testing machine.
- 6. To find the modulus of rigidity of a given specimen by Torsion testing machine.
- 7. To determine the Shear Modulus (or) Modulus of Rigidity of the given springmaterial.
- 8. Stress analysis by strain gages and stress concentration.

CE2703 Externals: 60Marks Internals: 40Marks

MECHANICS OF FLUIDS LAB

L-T-P-C 0-0-3-2

List of experiments:

- 1. Determination of coefficient of discharge using Venturimeter.
- 2. Determination of head loss due to friction in pipes.
- 3. Verification of Bernoulli's equation.
- 4. Calibration of Rotameter.
- 5. Determination of efficiency of multistage Centrifugal pump.
- 6. Measurement of point velocity using Pitot tube.
- 7. Determination of the Coefficient of Velocity from Jet Trajectory of small orifices.
- 8. Determination of the Coefficient of Discharge under Constant Head & Varying head through orifice.
- 9. Determination of thesurface profile of free and forced vortex and comparison with theoretical values.
- 10. To demonstrate the phenomenon of pipe surge resulting from a change in velocity of the water flowing through a pipe.
- 11. Determination of the characteristics of water hammer.

SEMINAR-I

Externals: 100 Marks

L-T-P-C 0-0-2-1

Objectives:

Objective of the project seminar is to actively involve the students in preparation of the final year project with regard to following components:

- Problem definition and specification
- > Literature survey, familiarity with research journals
- > Broad knowledge of available techniques to solve a particular problem.
- Planning of the work, preparation of graphs, bar (activity) charts and analyzing the results.
- Presentation oral and written.

The evaluation is purely internal and will be conducted as follows:

Preliminary Report on progress of the work and viva	05 marks
Final report	05 marks
Presentation and Defense before a departmental committee	
Consisting of Head, a senior faculty and supervisor	15 marks
